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sonal shortcomings and the difficulties which a task of this kind involves. Thus was born the enterprise which is now presented to the philosophical public. It is their duty, if they deem it useful, to support it in a simple manner—by taking part in it.

Xavier Léon.

Paris.

## MORE STRANGE MATHEMATICS AND MECHANICS.

The Hon. C. H. Chase contributes to the April number of *The Monist* a comparatively lengthy reply to the criticisms that I made, in the January number, of his original way of expounding and interpreting mechanical principles and of handling mathematical formulas.

In my criticism I called attention to the fact that Mr. Chase's formulas relating to the impact of two inelastic bodies of masses $m$ and $m'$ involved the equality of the two masses; and, taking those formulas to apply to *any* two inelastic bodies, I proceeded to derive from them some corollaries that appeared to me most interesting and important. Now Mr. Chase informs us that he did not intend to give those formulas as being general; that he knew, and that I ought to have known, that they applied only under the assumption $m=m'$; and that I was sarcastic, my reasoning irrelevant, and one of my formulas wrong.

Without wishing to steal Mr. Chase's thunder (of which my Christian humility does not allow me to be envious), I would state that I myself thought that probably, or at least possibly, his formulas for the momentum $M'$ and the kinetic energy $E'$ of the system after impact were intended by him as special formulas conditioned by the assumption $m=m'$. Other considerations, however, led me to the reasonable and well-founded belief that he took those formulas to be perfectly general.

In the first place, it is not the custom of mathematicians to represent equal quantities by different symbols; and when they exceptionally do so, they never fail to explain their reasons for departing from universal usage. While Mr. Chase very distinctly stated that, for convenience, the two impinging bodies would be supposed to be moving in the same direction and sense, he did not state (and this omission could hardly be accepted as an oversight) the more important fact that the two masses would be assumed to be equal.

In the second place, he says, referring to the kinetic energies $E$ and $E'$ of the system before and after collision, that "we see that $E$ and $E'$ must *in general* be different in magnitude, and $E>E'$." (Italics mine). Now, his formulas are: $E=\frac{1}{2}mv^2+\frac{1}{2}m'v'^2$, $E'=\frac{1}{2}(m+m')\frac{(v+v')^2}{4}$; and it is an exceedingly simple question of elementary mathematics to show that, if $m=m'$, and there is any impact at all, we shall *always* have, $E>E'$.

As I thought that Mr. Chase was aware of these simple facts, and as the phrase "in general," used as he uses it, means "not always" (Webster); and judging, besides, that he was at least tolerably familiar with the notation of a science on which he spoke with so much confidence, and on the treatment of which he generously gave some advice, I concluded that I was right in believing that the formulas he gave were to be taken as applicable in all cases. Whatever the real intention of Mr. Chase may have been, the evidence compels me to grant, without qualification, his own statement—that he "was at fault." I regret that the valuable consequences I derived from his formulas were gross errors into which I was led by assuming that a man that undertook to give *mathematical* demonstrations of the errors of great *mathematicians* was using the language and methods of *mathematics.*

Another strange thing to which I called attention was the peculiar and doubtless original manner in which Mr. Chase handled the parallelogram of velocities and the theory of work and energy; and, *à propos* of this subject, I ventured to say that he seemed to be somewhat confused. To this he answers with a dissertation on infinite forces acting during an infinitely short interval of time; he speaks of finding, by "the parallelogram of *forces,*" the resultant velocity of a particle on which there is only *one* force acting, this force having besides the very natural and common peculiarity of being infinite; and, in short, he succeeds in confirming my suspicion as to the afore-mentioned confusion of ideas. And it may not be out of place here to remark that another thing that seems to have created a great deal of confusion in Mr. Chase's mind is the unfortunate old expression "quantity of motion," used in the sense of momentum ($mv$). I need not insist on this statement, as I *know* that any one who has read Mr. Chase's two articles and is at all familiar with mathematics and mechanics has come to the same conclusion.

Having finished his defense, Mr. Chase takes the offensive, and with as much uncharity as pride he exposes my ignorance and displays his knowledge in the following crushing sentences:

"And it will not be out of place here to call attention to Mr. Llano's error in "stating the formula for the energy of two inelastic bodies after collision. It is not "$E-\frac{1}{2}\frac{mm'}{m+m'}(v-v')^2$, as Mr. Llano states, but is accurately expressed by the more "complicated formula,

$$E'=E-\tfrac{1}{2}\left[m\left(v-\frac{mv+m'v'}{m+m'}\right)^2+m'\left(\frac{mv+m'v'}{m+m'}-v'\right)^2\right].$$

"For a full discussion of which subject, consult Thomson and Tait's *Treatise on "Natural Philosophy*, Vol. I., pages 219–327."

I was much grieved at having allowed, as I thought, my habit of using practical and approximate formulas to lead me into the serious blunder of producing them in a purely scientific discussion, without first consulting Thomson and Tait's formidable treatise (which I had within reach of my arm when I was putting that gross error on paper). I hoped, however, that, after all, my error might prove to be what engineers call inappreciable for practical purposes, and that I might answer Mr. Chase by charging him with what the same gentlemen contemptuously call theoretical hair-splitting. In this hope, I handed "my" formula and the formula derived by Mr. Chase from the investigations of Thomson and Tait (*Treatise on Natural Philosophy*, pp. 219–327!) to my assistant (a young girl just out of the high school), for her to determine, if she could handle so complicated a formula, to how much my error amounted. And what was my surprise when, on simply glancing at the two formulas, she told me that they were one and the same thing, and that, by a little factoring and canceling that could be done mentally, Mr. Chase's "complicated" formula could be transformed identically into "my" formula!

This, besides other very obvious facts, convinced me that the best thing I might do would be to abstain from continuing a discussion from which the readers of *The Monist* will derive neither pleasure nor instruction; while, so far as I am concerned, I am confident that it will bring me neither pleasure, instruction, nor glory.

ANTONIO LLANO.

SCRANTON, PA.

## THE CHINESE TREE OF LIFE.

The Rev. Tan Tek Soon, a Chinese priest and a sinological scholar of repute, writing from Singapore and referring to the editorial article on *The Food of Life and the Sacrament* in the January and April *Monists*, adds the following comments concerning Chinese beliefs suggestive of the tree of life, the apples of the Hesperides, and kindred legends:

"So far as the Chinese are concerned it is the *t'o* (*prunus Persica*) or the peach which is regarded by their legendary lore as the usual 'fruit of the immortals.' The whole plant has thus a great significance both mythological and mystical. The fruit itself is the emblem of longevity and is thus a conventional symbol in all their arts. In necromancy the magic wand must be a branch of the peach-tree. The pinkish hue of its flowers gives the name to the most lucky of their colors, the *t'o hung*. Its importance is somewhat related to the *T'ai yang* of Chinese metaphysics, the sun or male-principle which is therefore viewed as the source of all life. There are also several stories of the theft of this fruit in Chinese legends, the most popular being that of Sun Wu K'ung, the monkey companion of the Chinese pilgrim Hien-tsung in the Siyuki novel. Stories of mythic heroes' having been born from a peach-fruit or of their mothers' having eaten of the fruit just before their births are also quite common."